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AUTHOR Schery, Teris; Spaw, Linda
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ABSTRACT

This paper reports the results of three investigations which examined the effects of computer-based language intervention with children who have severe handicaps. The first study looked at the vocabulary learning and use and growth in social communication of eight toddlers, comparing a computer-based approach with traditional intervention techniques. The computer treatment condition involved use of an Apple IIe microcomputer with a pressure-sensitive membrane keyboard, Echo II speech synthesizer, and software for developmentally delayed children called "Programs for Early Acquisition of Language". Results of the study indicated that the children made considerable growth in language regardless of the treatment condition received. A second investigation compared computer-based language intervention with a general language program that was part of the special education curriculum in self-contained classrooms for 52 developmentally delayed or multihandicapped children ages 3-12. This study revealed improved language scores when the computer-based training program was administered. The third study contrasted language progress when paraprofessionals (parent volunteers) trained toddlers with severe handicaps on an interactive computer-based language intervention program, with an equivalent period of training with a speech-language pathologist (SLP). Two subjects showed more growth when working with the paraprofessionals, while the other two showed more general language development when working with the SLP. (JDD)

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Computer Talk: Helping Young Handicapped Children Communicate

Teris Schery, Ph.D, Research Professor Education
and Human Development, Vanderbilt University

Linda Spaw, M.A. Speech-Language Pathologist
Diagnostic Center, California Dept.of Eudcation

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This paper will focus on the results of three investigations which examined the effects of computer-based language intervention with severely handicapped children. While significant progress has been made in utilizing computer technology to enhance and stimulate communication skills with severely handicapped populations, relatively little research has been conducted which examines the potential usefulness of such technology to facilitate communication development with this population.

STUDY ONE

In the first study, O'Connor and Schery (1986) looked at the vocabulary learning and use, as well as social and communication growth of 8 severely handicapped toddlers under two different language conditions. A computer-based approach was compared to traditional intervention techniques. The 8 handicapped toddlers met the basic criteria of readiness for the emergence of linguistic symbols. Each child was non-verbal, non-signing or had evidence only of the very initial use of single-word sign at the start of the project. A cognitive level of 15 months was established for each child, and it was determined that auditory and visual problems were corrected to within grossly normal limits. Primary diagnosis for six of the children was Down Syndrome. Socioeconomic level ranged from white collar worker to unemployed.

The computer treatment condition consisted of an Apple IIe microcomputer with a pressure sensitive membrane keyboard and Echo II speech synthesizer, and software which was then in development by Laura Meyers specifically for developmentally delayed children 18 months to 5 years of age [Programs for Early Acquisition of Language (PEAL)].

Each of these 8 children were randomly assigned to two treatment conditions, so that half started in the computer context and half in the traditional context. Each subject received 12 20 minute intervention sessions in each condition over a period of from 6 to 10 weeks. At mid-point, the subjects were then switched to the opposite condition. A standard set of measures was administered to each subject before intervention, again at mid-point and within one week of the final intervention session. Measures included the **Peabody Picture Vocabulary Test-Revised (PPVT-R)**, a criterion referenced test of the actual vocabulary items from the intervention program, the **Initial Communication Processes Observational Scales (ICP)**,(Schery & Wilcoxen,

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1982), and a formal parent interview using the **Vineland Adaptive Behavior Scales (Vineland)** (Sparrow, et all, 1984).

The results of this study indicated that the children made considerable growth in language regardless of the treatment condition received. Parents, teachers, and the language clinicians all agreed in their documentation of growth in language. Secondly, when looking at motivational behaviors such as attention to task and/or the clinician, appropriate responding and initiated goal directed behavior, a statistically significant difference was not found but the computer did have a slight edge on this variable.

STUDY TWO

Having completed this investigation, Schery and O'Connor (1992) wanted to gain a better understanding of how to implement this technology into the school environment. Thus, a second investigation, funded by the U.S. Department of Education, was designed to determine the effects of specific computer-based language intervention as compared with a general language program that was part of the special education curriculum in self-contained classrooms for severely handicapped children. In this study, the subjects included 52 developmentally delayed or multi-handicapped children between the ages of 3 and 12 years. They were enrolled in special education programs operated by the Los Angeles County Office of Education. All of these children had attained a cognitive level of at least 16 months and no more than 36 months, as documented by a school psychologist. All of them had vision and hearing corrected to within grossly normal limits, and all subjects were non-verbal, non-signing or communicating at no more than the single symbol level. Diagnoses included retardation (unspecified etiology and Down Syndrome), autism, cerebral palsy, and severe language disorders.

Again, the **Programs for Early Acquisition of Language (PEAL) software (Meyers,** 1985) was used on an Apple II system with a speech synthesizer and Muppet Learning Keys keyboard. Both early levels of the program, Exploratory Play (18 months to 3 years) and Representational Play (2-5 years) were used.

The 52 subjects were grouped into pairs, matched for similarity on dimensions including, age, IQ and type of handicap. Then half of the subjects were assigned to Phase I of the treatment, while those assigned to Phase II received only their regular classroom instruction. Each subject received 16 individual, 30 minute training sessions over a period of 10 weeks. A graduate student in Communication Disorders worked individually with each child in a room or quiet area close to the child's classroom. A standard

battery of communication and communication related measures were administered to all subjects before intervention, at mid-point, and within 3 weeks of the completion of all training. At 6-7 weeks after completion of post-testing, subjects were seen for follow-up testing on retention of the trained vocabulary.

Since this was a small subject study, clustering of individual dependent variables into conceptually-related composite variables allowed more reliability and reflected the strong overlap among the various measures used in the study. Table1 below shows the various measures used, while Table 2 shows how the individual variables were clustered for statistical analysis.

Table 1

DEPENDENT VARIABLES FOR COMMUNICATION-RELATED OUTCOMES BY REPORTING SOURCE

Administered Directly by Researchers:
- Peabody Picture Vocabulary Test-Revised (Dunn & Dunn, 1981)
- Expressive One-Word Picture Vocabulary Test (Gardner, 1979)
- PEAL Criterion-Related Mastery Test (unpublished)

Obtained Through Parent Interviews:
- Vineland Adaptive Behavior Scales, Survey Form
  - Communication
  - Socialization
  - (Sparrow, Balla, & Cicchetti, 1984)

Administered by Classroom Teacher:
- Vineland Adaptive Behavior Scales, Classroom Edition Interpersonal Relationships (Sparrow et al., 1984)
- Brigance Inventory of Learning Skills - Level 1
  - Prespeech Behaviors
  - Speech and Language
  - General Knowledge
  - (Brigance, 1978)

Table 2

COMPOSITE VARIABLES USED AS OUTCOME MEASURES

Criterion Training Vocabulary
- Sum of raw scores earned on levels 1 and 2 of the PEAL Criterion Related Mastery Test

General Language Skills
- Peabody Picture Vocabulary Test
- Expressive One-Word Picture Vocabulary Test
- Vineland Communication
- Brigance Prespeech
- Brigance Speech & Language
- Brigance General Knowledge

Social/Interpersonal Skills
- Vineland Socialization (parent)
- Vineland Interpersonal (classroom edition)

Using these composite variables, some interesting results were found:

1. Training effects of the vocabulary presented in the computer condition - the PEAL showed the strongest effect.

2. Language growth - results indicated that language scores for a wide range of more standard measures were improving over time for all subjects but they improved more when the training program was administered.

3. Social/Interpersonal -At pre-test there was no significant difference between the two groups. At midpoint there was a significant difference with the Phase 1 subjects, showing the effect of treatment. At post-test there was no longer a significant difference between the groups as Phase II subjects caught up after their delayed training.

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STUDY THREE

In the third study, Linda Spaw, a graduate student at California State University, examined the use of paraprofessionals (parent volunteers) to train two-year old severely handicapped toddlers on the same interactive computer-based language intervention program. This investigation utilized 4 subjects and measured language growth under two different treatment conditions. Computer-based paraprofessional training was contrasted with language progress during an equivalent period with a Speech-Language Pathologist. Again, a cognitive level of 15 months was established for each child, and it was determined that vision and hearing were corrected to within grossly normal limits. The diagnoses included Down Syndrome, prematurity with drug exposure, speech delay, and failure to thrive.

Subjects were paired by developmental level and one in each pair was assigned to receive training in the "Paraprofessional" training first, while the other received the "Professional" (SLP) training first. The subjects received two series of 12 20-minute sessions over a period of 6-8 weeks each. After the first 12 sessions, each child was seen for a subsequent training period by a trainer with alternate credentials. A standard set of measures was administered to each subject before intervention, again at mid-point and after the final treatment phase.

Two subjects made more growth when working with the Paraprofessionals, while the other two showed more general language development during the period they were working with the SLP. These results would support the observation that paraprofessional facilitation of a computer-based language program was no less effective than when these children worked with a trained speech-language pathologist.

All of this research demonstrates the effectiveness of computer-based intervention with severely handicapped children in terms of facilitating their communication development.

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